ALIGNMENT PROCEDURE

In normal service, The Source does not require tuning. However, when components are replaced, the alignment procedure outlined below should be followed in the sequence indicated in order to provide proper adjustment. Component designators refer to P.C. Board Schematics. Access to some trim adjustments require removal of the keyboard. Allow the instrument to warm up for approximately 30 minutes prior to starting alignment procedure.

POWER SUPPLY ADJUSTMENTS

POWER SUPPLY, BOARD 1

Set +15V supply by adjusting +15V trim R14 for +15.000V +/- 10mV. Set -15V supply by adjusting -15V trim R4 for -15.000V +/- 10mV. Check both +5V supplies for +5.0V +/- 0.2V.

SYNTH, BOARD 2

Connect DVM to emitter of Q1. Set +10V supply for +10.000V +/- 10mV by adjusting 10V ADJ trim R12.

D/A CONVERTER ADJUSTMENT, BOARD 3

Put OSC 1 LEVEL in edit and set to 0. Adjust D/A ZERO trim R60 for 0.000V +/- 2mV. (Connect DVM to U12 pin 1 on Synth Board 2.) Set OSC 1 LEVEL to 99. Adjust D/A FULL SCALE trim R62 for 10.000V +/- 2mV. Connect DVM to KB buss, Connector (P36-4), press high C and adjust KYBD trim R72 for 8.824V +/- 5mV.

SYNTHESIZER CIRCUIT ALIGNMENT, BOARD 2

OSC 1 SCALE ADJUST

Set control panel to the following:

GLIDE	0
MOD	OFF
OCT 1	32'
W/S 1	SAW
SYNC	OFF
OSC 1 LEVEL	99
NOISE	0
OSC 2 LEVEL	0
CUTOFF	0
EMPHASIS	0
COUTOUR AMT	99
Both SUSTAINS	99
All other contour functions	0
KB TRANSPOSE	0
Center Pitch Wheel	

Connect reference oscillator set to 65Hz, through series 4.7K resistor and 10uf capacitor, to connector P23-7. Depress low C and zero beat using RANGE trim R127.

Depress high C and zero beat using SCALE trim R123. Check low C and repeat above procedure if necessary.

OSC 1 OCTAVE ADJUST

Set up the same as for Scale Adjust.

Depress low C and zero beat using rear panel FINE TUNE R228. Change OSC 1 FOOTAGE to 8' and zero beat using OCT trim R122. Repeat until both ends zero beat.

OSC 1 HIGH END COMPENSATION

Set up the same as for Scale Adjust except set OCT 1 to 8' and KB TRANSPOSE to +1.

Depress low C and zero beat using rear panel FINE TUNE R228. Depress high C and zero beat with Osc 1 HIGH trim R100.

OSC 1 TUNE CHECK

When high end compensation is set, check SCALE and OCTAVE adjustments. If they have changed, repeat steps above until all are correct.

OSC 2 SCALE

Set control panel the same as for Osc 1 Scale Adjust with the following exceptions:

OSC 2 LEVEL	99
OCT 2	32'
INTERVAL	1

The procedure is the same as for Osc 1 Scale Adjust except use OSC 1 as a reference pitch and adjust SCALE trim R72.

OSC 2 OCTAVE ADJUST

Follow the same procedure used for Osc 1 except change OSC 2 FOOTAGE between 32' and 8' (OSC 1 FOOTAGE remains at 16') and adjust OCT trim R71.

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OSC 2 HIGH END COMPENSATION

Follow the same procedure used for Osc 1 except adjust HIGH trim R39.

OSC 2 TUNE CHECK

Refer to Osc 1 Tune Check procedure.

OSC 2 RANGE ADJUST

Set the following controls:

OSC 1 OCTAVE	8'
OSC 2 OCTAVE	16'
INTERVAL	50

To access Osc 2 AUTO TUNE, press and hold STORE and press OSC 2 LEVEL. Set to 50 using incremental control knob. Adjust RANGE trim R78 for zero beats (unison).

INTERVAL MONOTONICITY

Turn OSC 1 LEVEL to 0 and connect scope to U7A, pin 1 (2V/DIV DC). Turn up INTERVAL until a 10V transition occurs on scope. Move INTERVAL up and down through this transition and adjust INT trim R70 for a minimum pitch change.

FILTER LADDER BALANCE

Set the following controls:

TRANSPOSE	0
OSC 1 LEVEL	0
OSC 2 LEVEL	0
CUTOFF	0
EMPHASIS	0
CONTOUR AMT	0
LOUDNESS SUSTAIN-ATTACK-DECAY-RELEASE	0
VOLUME	max

Strike low C repeatedly and with scope connected to audio output jack J4, adjust LADDER BAL trim R167 for pulse of <50mV.

FILTER LEVEL BALANCE

Set the control panel the same as for Filter Ladder Balance except set EMPHASIS to 99 and LOUDNESS SUSTAIN to 99.

Hold down low C key. Measure voltage on pin 3 of U40A and adjust LEVEL BAL trim R168 to obtain the same reading on pin 1 of U40A.

FILTER EMPHASIS ADJUST

Using the same control panel settings as above except EMPHASIS at 80, adjust EMPH trim R164 until filter just begins to oscillate (observe on scope).

FILTER, SCALE AND RANGE ADJUST

Return control panel settings to LEVEL BALANCE setup and place KB TRACKING to FULL. Connect reference oscillator in the same manner used for Osc 1 Scale Adjust except set frequency at 80Hz. Depress low C and zero beat using SCALE trim R155. Depress high C and zero beat by adjusting RANGE trim R152. Repeat above steps until both ends are correct.

CUTOFF MONOTONICITY

Using the same control panel setup as in the previous step except CUTOFF at 50, connect scope to U8A, pin 1 (2V/DIV DC). Turn up CUTOFF control while watching for a 10V transition on scope. Turn CUTOFF control up and down just enough to cause this transition to occur and adjust CUTOFF trim R146 for minimum pitch change.

FILTER CONTOUR ATTACK & DECAY TIME

Set the following controls:

ATTACK	99
DECAY	0
SUSTAIN	0
RELEASE	0

Connect scope to pin 7 of U43B (2V/DIV DC). Depress any key and adjust RANGE trim R201 for attack time of 8 seconds.

FILTER CONTOUR BALANCE

Set the following controls:

CONTOUR AMT	99
ATTACK	0

Short pin 9 of U26 to ground. Adjust CONTOUR BAL trim R205 so that the voltage on pin 6 of U45 is 0.000V +/- 10mV with respect to ground.

LOUDNESS CONTOUR ATTACK & DECAY TIME

Set up the same as for Filter Contour except connect scope to pin 1 of U43A and adjust RANGE trim R179.

MODULATION OSC RATE

Connect DVM to pin 7 of U13B and scope to pin 7 of U48B. Turn MOD RATE control to obtain 5.2V reading. Adjust RANGE trim R223 for 7Hz (142.6 msec) +/- 0.5Hz.

GLIDE TIME

Set GLIDE to 99. Adjust RANGE trim R19 to yield glide time from low C to high C and vice versa between 3 to 5 seconds.

CHIP TEMPERATURE ADJUSTMENT, BOARD 2

> **NOTE**
>
> Oscillator chip temperature is factory set and should not need further adjustment. Do not adjust unless the oscillator IC or components in the temperature compensation circuit are changed or proper tuning can not be accomplished.

OSC 1 CHIP TEMPERATURE ADJUSTMENT

Turn TEMP trim R131 fully counterclockwise (wiper at -0.6V) and leave in this position for about 10 minutes to allow chip to cool to room temperature.

a) Measure emitter voltage of Q15 (pin 3 of U34) with respect to ground (use 1K in series with probe) and record reading (V_C).

b) Estimate room temperature in degrees C (T_R).

c) Subtract room temperature from 55°C to determine temperature rise needed to reach 55°C.

d) Multiply result by 2mV. (Transistor VBE decreases by 2mV/°C.)

e) Add this product to cold reading (V_C) measured above to determine hot reading (V_H).

Example: T_R = 22°C (72°F); V_C = -616mV;

$V_H = V_C + 2 (55 - T_R)$

$-616 + (2 \times 33) = -550mV = V_H$

f) Adjust TEMP trim R131 to obtain reading determined above at emitter of Q15 (U34). Chip temperature now set at 55°C.

OSC 2 CHIP TEMPERATURE ADJUSTMENT

Set up the control panel the same as for Osc 1 and follow the same procedure except TEMP trim R83 is adjusted to set voltage at emitter Q8 (pin 3 of U26).

INCREMENTAL CONTROL CHECK, BOARD 3

DUTY CYCLE

Attach a dual trace scope at U19 pin 6 (ϕ1) and U19 pin 4 (ϕ2). Rotate incremental control and note pulse duty cycle should be nominal 50% +/- 25%. Check clockwise and counterclockwise rotation.

PHASE RELATIONSHIPS

Using same setup as above, check phase of the positive edge of ϕ1 in comparison to ϕ2 at approximately 250 RPM (1kHz output frequency). Positive edge of ϕ1 should be at 50% +/- 10% of ϕ2 pulse width. Since adjustment of phase requires a change in gap between VQ1 and VQ2 OPTO interruptors, malfunctioning unit should be replaced with a factory adjusted assembly.

REPLACEMENT PARTS LIST

STANDARDIZED COMPONENTS

REF DESIG	DESCRIPTION	PART NO. SERIES
RXX	Resistor, 1/4W, 5%, Carbon Film [Resistance (XX) (X) Multiplier]	852-312XXX-001
RXX	Resistor, 1/4W, 1%, Metal Film [Resistance (XXX) (X) Multiplier]	853-42XXXX-031

MISCELLANEOUS PRINTED CIRCUIT BOARDS, BOARD 4, BOARD 5 AND BOARD 6

REF DESIG	DESCRIPTION	PART NO.
P42	Header, CIS, Right Angle, .100 Ctrs.	910-042392-005
LED 1,2,3	LED, Red	939-041850-004
U1	IC, Decoder/Driver, 7447	991-041097-001
U2	Display, 1-1/2 Digit, MAN, 6630	939-042633-001
U3	IC, Decoder/Driver, 7447	991-041097-001
U4	Display, 1 Digit, MAN, 3610A	939-045310-001
U5	IC, Decoder/Driver, 7447	991-041097-001
U6	Display, 1 Digit, MAN, 3610A	939-045310-001
C1, C2	Capacitor, Tubular, .01 uf	947-045011-103
R26	Resistor, Rotary, 5K, 10% Log, VOLUME	925-045323-001
SW1	Switch, Blue, +1	960-040223-016
SW2	Switch, Blue, 0	960-040223-017
VQ1, VQ2	Opto-Interruptor, MCT8	939-045311-001
Q1, Q2	Transistor, NPN, 2N3904	991-041051-002